

CLAIMS

Sub Q1

1. A protoporphyrinogen oxidase tolerant to photobleaching herbicide and derivatives thereof, comprising a polypeptide having the amino acid sequence represented by SEQ ID No.2 or a mutated peptide having deletion, addition, substitution, etc. of one or more amino acids in the above amino acid sequence and having an enzyme activity substantially equivalent to that of said protoporphyrinogen oxidase tolerant to photobleaching herbicide.

2. The protoporphyrinogen oxidase tolerant to photobleaching herbicide and derivatives thereof, comprising a polypeptide having the amino acid sequence represented by SEQ ID No.2, wherein one or more amino acids is deleted and the polypeptide has an enzyme activity substantially equivalent to that of said protoporphyrinogen oxidase tolerant to photobleaching herbicide.

3. The protoporphyrinogen oxidase tolerant to photobleaching herbicide and derivatives thereof, comprising amino acid sequence represented by SEQ ID No.2, from which a transit peptide is deleted and one or more amino acids is deleted, added or substituted, and the polypeptide have an enzyme activity substantially equivalent to that of said protoporphyrinogen oxidase tolerant to photobleaching herbicide.

4. The protoporphyrinogen oxidase tolerant to photobleaching herbicide, comprising an amino acid sequence represented by SEQ ID No.2, from which a transit peptide is deleted and the polypeptide have an enzyme activity substantially equivalent to that of said protoporphyrinogen oxidase tolerant to photobleaching herbicide.

5. The protoporphyrinogen oxidase comprising an amino acid sequence represented by SEQ ID No.2

6. The protoporphyrinogen oxidase according to Claims 1-5, wherein the photobleaching herbicide is a pyrazole compound.

Sub Q2

7. The protoporphyrinogen oxidase according to Claims 1-5, wherein the photobleaching herbicide is a compound selected from the group consisting of ethyl 2-chloro-5-(4-chloro-5-difluoromethoxy-1-methyl-1H-pyrazole-3-yl)-4-fluorophenoxyacetate, ethyl 2-[5-(4-chloro-5-difluoromethoxy-1-methyl-1H-pyrazole-3-yl)-2,4-dichloro-phenylamino]propionate, 4-chloro-3-[4-chloro-2-fluoro-5-methoxyphenyl]-5-

Ans- a3
~~difluoromethoxy-1-methyl-1H-pyrazole, 4-chloro-3-[4-chloro-2-fluoro-5-(2-propynyl)oxyphenyl]-5-difluoromethoxy-1-methyl-1H-pyrazole, ethyl 2-[2-chloro-5-(4-chloro-5-difluoromethoxy-1-methyl-1H-pyrazole-3-yl)-4-fluorophenoxy]propionate and 1-methylethyl 5-[4-bromo-1-methyl-5-(trifluoromethyl)-1H-pyrazole-3-yl]-2-chloro-4-fluoro-benzoate, 4-chloro-3-(4-chloro-2-fluorophenyl)-5-difluoromethoxy-1-methyl-1H-pyrazole.~~

8. The protoporphyrinogen oxidase according to Claims 1-5, wherein the photobleaching herbicide is ethyl 2-chloro-5-(4-chloro-5-difluoromethoxy-1-methyl-1H-pyrazole-3-yl)-4-fluorophenoxyacetate.

9. A gene encoding a protein comprising the amino acid sequence according to Claim 1.

10. A gene encoding a protein comprising the amino acid sequence according to Claim 2.

11. A gene encoding a protein comprising the amino acid sequence according to Claim 3.

12. A gene encoding a protein comprising the amino acid sequence according to Claim 4.

13. A gene encoding a protein comprising the amino acid sequence according to Claim 5.

14. A gene comprising an amino acid sequence represented by SEQ ID No.3.

15. A recombinant vector comprising the gene according to Claim 9.

16. A recombinant vector comprising the gene according to Claim 10.

17. A recombinant vector comprising the gene according to Claim 11.

18. A recombinant vector comprising the gene according to Claim 12.

19. A recombinant vector comprising the gene according to Claim 13.

20. A recombinant vector comprising the gene according to Claim 14.

